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AGRICULTURAL NEWS LETTER

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THIS PUBLICATION GIVES INFORMATION on new developments of interest to agriculture based on the work done by scientists and agricultural field men of the du Pont Company and its subsidiary companies.

It also gives reports of results obtained with products developed by these companies in the field whether the tests are made by field men of the companies, by agricultural experiment stations or other bodies. Also data on certain work done by agricultural stations on their own account and other matters of interest in the agricultural field.

This issue contains:

New Laboratory and Greenhouse Will Provide Facilities for Largely Extending Grasselli Pest Control Research

Results of Dust Treatments for Grain Diseases Reported from California and Canadian Sources

The Value of Addition of Phosphoric Acid to Silage Demonstrated by New York Experiment Station Tests

The Use of Formaldehyde in India for Treating Oat Seed Against Covered Smut by Dry Spraying

Steps in the Formation of an Egg in a Hen Shown in a Kansas State College Color Motion Picture

"Brown Patch" on Lawns Can be Prevented by the Timely Use of Mercury Compounds

Blasting Gully Banks Contributes to Better Growth of Trees and Other Vegetation on Banks and Bottom

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NEW LABORATORY AND GREENHOUSE WILL PROVIDE FACILITIES FOR LARGELY EXTENDING GRASSELLI PEST CONTROL RESEARCH

EDITOR'S NOTE:- This announcement should be of interest to all concerned with pest control and the development of new products for use in agriculture and otherwise for combatting pests. Acknowledgment is made here of the valuable cooperation given in the past by federal and state agencies. Continuance of this assistance is invited by the Grasselli group.

Extensive research in agricultural and other pest control will be carried on by a staff of scientists in a laboratory and greenhouse now under construction for the Grasselli Chemical Company at the du Pont Experimental Station. The structures will be completed and equipped within the next few months.

The pest control research activities have been reorganized in the Chemical Department of the Grasselli Chemical Company, of which E. A. Taylor is director, and transferred from Cleveland, Ohio, to Wilmington, Delaware. Research has been organized as a separate division, with Dr. W. H. Tisdale in charge.

Sales introduction of insecticides, fungicides and other products developed in the new laboratory will come under the New Products Division of the Grasselli Chemical Company, Cleveland. E. B. Alvord is manager of the division.

The present staff of entomologists, plant pathologists and chemists of the Pest Control Research Division will be increased when the new laboratory is ready for occupancy.

Consolidation of the pest control research work of the Grasselli Chemical Company and coordination of the activities of biologists and chemists working on pest control at the du Pont Experimental Station were among the reasons for locating the laboratory and other facilities at Wilmington. Direct contact will be established with the staff and laboratories of the Experimental Station which is the central chemical research organization of the du Pont Company.

RESULTS OF DUST TREATMENTS FOR GRAIN DISEASES REPORTED FROM CALIFORNIA AND CANADIAN SOURCES

EDITOR'S NOTE:- Growth of interest in seed treatment with disinfectants developed by scientific research indicates that eventually such treating of seed grains will become as standard a practice as the use of fertilizers.

The following is a reprint of a bulletin prepared by the College of Agriculture, University of California, and the United States Department of Agriculture, Bureau of Plant Industry, cooperating. Division of Agronomy, Davis, California, 1935.

CONTROL OF DISEASES

Barley stripe and covered smut are two of the most destructive diseases of barley. They not only reduce the yield of the crop but the presence of smutted heads and stripe diseased kernels make the grain less satisfactory for malting. Consequently, such diseased grain has a lower market value.

Fortunately, these two diseases may be controlled by seed treatment, the same treatment being effective in controlling both diseases. A description of these diseases together with control measures follows.

Covered Smut is the only smut commonly found on barley in California. The kernels of diseased heads are replaced by black spore masses which at first are covered with a thin white membrane.

Barley Stripe has become serious in California during late years. Diseased plants may be identified by the parallel striping of the leaves caused by the formation of spores on the leaves, which cause the leaves to fray after they become dry. Heads usually are not formed on striped plants, but when they are formed they are very light in weight and are dark brown in color as is the straw of diseased plants. Stripe disease is first noticeable about the time barley is heading, at which time the premature browning of the plants becomes apparent.

Stripe disease is sometimes confused with some of the leaf spots of barley which are caused by closely related diseases but which cause a brown spotting or blotching of the leaves. Such plants form heads which are normal in color, but the seed may be shriveled when the leaf spot diseases are bad. These diseases are not controlled by seed treatment.

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Seed treatment for the control of barley stripe and covered smut.

Both of these diseases may be controlled by one treatment.

New Improved Ceresan applied at the rate of one-half ounce to the bushel (48 pounds) of barley has given good control of stripe at Davis. It has given good control of smuts in other places and should prove satisfactory here. Care should be exercised to apply the prescribed amount per bushel. The directions for handling treated grain are printed on the container and should be followed carefully.

Copper carbonate is somewhat less effective than New Improved Ceresan. However, when thoroughly applied at the rate of 3 ounces per bushel it has reduced stripe from forty per cent to seven or eight per cent at Davis. Where it is used year after year, copper carbonate will satisfactorily control stripe and covered smut. It is very essential to use the proper amount of dust, otherwise the results will be disappointing.

Seed treatment is a good farm practice even if you think your fields are free from stripe and smut. If you continue to sow untreated seed you are certain to get one or both of these diseases in your barley.

Treating Seed with Dusts in Canada

The summary which follows is that of a paper titled "Experiments on the Control of Cereal Smuts by Seed Treatment" by W. F. Hanna and W. Popp, Dominion Rust Research Laboratory, Winnipeg, Manitoba. This paper was printed in Scientific Agriculture, July, 1935.

A brief reference is made to improvements which have been effected in seed disinfectants used for the control of cereal smuts. Organic mercury dusts, because of their effectiveness and the ease with which they can be applied to seed, appear to be replacing liquid treatments and the copper dusts.

During the period 1930-1934, 37 preparations were tested in field experiments for the control of smut. The results obtained with 16 of these preparations are summarized in tables.

Formalin gave good control of bunt of wheat, covered smut of barley, and the smuts of oats. This treatment is relatively cheap, but it is more difficult to apply than the dust treatments, and under certain conditions may cause seed injury. The copper dusts are to be recommended only for treatment of wheat and hull-less oats. In general, they gave good control of bunt when the seed was not too heavily contaminated with spores. New Improved Ceresan, an organic mercury dust, was effective in controlling bunt

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of wheat, covered smut of barley, and the smuts of oats. This dust, because of the light rate at which it is applied, should not cause clogging of drills. In certain experiments, the results of which are not recorded in this paper, seed treated with copper and mercury dusts gave a higher percentage of seedling emergence than untreated seed.

"Ceresan" is a trade mark registered in the U. S. Patent Office by the Bayer-Semesan Company, Wilmington, Delaware.

THE VALUE OF ADDITION OF PHOSPHORIC ACID TO SILAGE DEMONSTRATED BY NEW YORK EXPERIMENT STATION TESTS

EDITOR'S NOTE:- The findings as to the value of phosphoric acid in silage were discussed in the radio broadcast which is presented here. Of particular importance at this time is the fact that the addition of phosphoric acid can make available for use as feeds the remnants of certain crops in areas affected by the drought. This method of treating silage was developed by Dr. J. K. Wilson, Professor of Soil Bacteriology, Department of Agronomy, New York State College of Agriculture, Cornell University, Ithaca, New York.

About thirty years ago there was started in the eastern states a project, the object of which was the introduction and growing of more high protein crops. Ten years later the effect of this program was being noticed not only in the quantity of such crops grown but also in the wide-spread interest that was developing throughout the nation. The rapid increase in the number of acres being sown to alfalfa as well as those areas required for the newly introduced legumes such as soybeans, sweet clover and lespedeza developed new problems.

These extensive increases in leguminous forage crop production for animal food, both in kind and quantity, have prompted requests for methods of preserving these crops. Often weather conditions retard or prevent haymaking. In a large number of instances the cut material spoils, or hay produced from it is of such an inferior quality that animals refuse most of it.

Little or no difficulty is encountered in making silage from corn, sorghum or millet. Numerous attempts, however, to produce silage from such crops as alfalfa, red or alsike clover, sweet clover and soybeans, have resulted in an unpalatable product, which was generally returned to the land as fertilizer. The reason for these ensiling differences has only recently been established. The main reason why the high protein crops fail to ensile properly is that they do not contain sufficient acid producing substances. On the average, such crops contain about one-third to one-sixth as much fermentable sugars as corn or sorghum. In addition it requires more acid to preserve a high protein forage than it does to preserve a forage like corn that has low protein content. This is so because the legumes possess a larger percentage of nitrogen, calcium and other acid neutralizing substances. All high protein crops have been found deficient in acid producing substances. Some of these you may know. They are - alfalfa, field beans, all the

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clovers such as red and alsike, cowpeas, sweet peas, lespedeza, lupines, garden peas, soybeans, and vetch.

Two Methods for Treating High Protein Crops

These striking differences in the chemical composition of the low and the high protein crops suggest two methods for treating the latter crops so that a good silage can be made. One of these methods comes from the Kansas State Agricultural College. The authors of this work state that the presence of acid is necessary in making silage. Lactic acid, the principal acid in sour milk, is the most important acid in preserving forage crops. The acids are produced by the action of bacteria upon the sugars in the plants used for silage. Since this is the case, such crops as alfalfa, clover, vetch and soybeans which do not ferment properly must be deficient in acid producing substances. Therefore, it is suggested that we add an acid forming substance. Perhaps the easiest way at the present time is to supplement the fermentable sugars that are naturally present in the forage material with such substance as molasses. The sugar in the molasses, as well as that in the forage, will be changed into acids that preserve the crop. Experience and experiments here at Cornell have shown that the addition of 1-1/2% of fermentable sugars to the freshly cut forage will usually produce a good silage. Since molasses contains a variable quantity of water and thus at times not more than 60% of sugar, not less than 40 pounds should be added to each ton of the green crop.

Recent recommendations from persons who have employed this method to fill silos of 80 to 100 tons are that not less than 60 pounds of molasses should be added. At the Kansas State Agricultural College 200 pounds of black strap molasses were added to each ton of the green crop and no smaller applications were made to determine whether this large application was necessary. It is possible that crops require the addition of more molasses when grown on a highly calcareous soil than when grown on a soil with a low calcium content. A larger application of molasses than is actually needed to produce the desired acidity, will do no harm. It will only increase the cost of the treatment. Molasses is being used in increasing quantities by New York farmers to produce a good silage and at present has proved to be the most practical material to furnish acid producing substances for the manufacture of silage from crops with a high protein content.

The Use of Phosphoric Acid

The addition of acids for the preservation of foods has been practiced for a long time. We are all familiar with sauerkraut, pickles, and silage which are good examples. Therefore, why not

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add acids if it is suspected that a sufficient quantity to preserve the crop is not going to develop spontaneously. This can be done if an acid is selected which will not injure the health of the animals. Perhaps the most profitable acid for this purpose is phosphoric, although other acids have been employed and are being recommended for this purpose. If we use this acid it will accomplish several things. It will, first of all, preserve the crop and then serve to increase the phosphorus content of the feed for the animals and finally inhance the fertilizing value of the material to be spread on the land. It places the phosphorus in front of the cow for her use rather than in the trench behind her. It does away with the feeding of bone meal while the animals are being fed on silage. It is practically non-corrosive. It is not dangerous to use and may be obtained at reasonable prices.

Although at present phosphoric acid is not on sale in quantities economical for this purpose, quotations from manufacturers indicate that this acid can be obtained in tank car lots at a satisfactory price. Enough may be obtained for 50 to 75¢ to preserve a ton of freshly cut material, making the phosphorus relatively less expensive than when purchased in the form of superphosphate. Approximately 17 pounds of the 90% syrupy acid to a ton will do the trick; 20 or even 25 lbs. apparently will do no harm. If only 11 lbs. are added it will increase the acidity of the silage material to some extent and fermentation of the sugars contained in the crop will usually carry the acidity to the preservation point.

Carbohydrates, molasses or phosphoric acid can be added to the forage as it is being run through the cutter. This insures a thorough mixing and requires no expensive equipment. If other acids such as hydrochloric and sulphuric are added they require special care and equipment. Also, they may reduce the alkaline reserve of the blood of the animals to a dangerously low point unless great care is used in applying them when treating the fodder.

If an acid, or a mixture of acids is employed to preserve the crop, there should be produced a silage whose feeding quality is better than the freshly cut materials, and by employing any of these methods we are independent of weather conditions that often prevent or interfere with hay-making.

THE USE OF FORMALDEHYDE IN INDIA FOR TREATING OAT SEED AGAINST COVERED SMUT BY DRY SPRAYING

EDITOR'S NOTE:- Below is a reprint of a paper titled "A Dry Spray Method of Treating Oat Seed Against Covered Smut", Indian Journal of Agricultural Science, Vol. IV, No. 5, 1934. The joint authors are B. B. Mundkur, A. M., Ph. D., Assistant Mycologist, and M. Azmutullah Khan, Fieldman, Imperial Institute of Agricultural Research, Pusa, Bihar, India.

In a previous paper the senior author (Mundkur, 1934) has shown that the predominant smut of oats in India, so far as the present information goes, is the covered smut due to Ustilago kolleri Wille (=U. levis). An effective method of treating the oat seed against this smut is reported in this paper.

The cultivation of oats is restricted at the present time in India to the vicinity of towns and cities with cantonments where the crop is used as forage for horses and mules. The grain of the Indian oats is of rather poor quality and difficult to husk and Shaw and Bose (1933) mention this as a chief reason for the lack of interest in this very nutritious cereal. The cultivation of this crop, according to the same writers, is on the increase and with the introduction of good types which the Botanical Section at Pusa is developing, it is likely to be more popular.

The crop is host to several fungous diseases but in India the greatest damage is caused by the smut disease. Exact figures assessing the loss are not available but Butler (1918) mentions that in certain oat growing sections about one-tenth of the crop is usually lost due to this disease. In 1904-1905 he found that one plant in every ten was affected by the smut at Dehra Dun and from the writers' experience for the last three years at Pusa where the crop was under observation it became apparent that the disease was causing much damage to the crop.

Literature Review

That some of the smut diseases were seed-borne seems to have been known even as early as 1755 for Tillet according to de Bary (1853) treated smutted seed grain with lime and reduced the smut in his fields. In 1807 Prevost demonstrated the superiority of copper sulphate as a seed treatment and showed that while one plant out of three was smutted in untreated plots, only one in four thousand was smutted in treated fields. Since that time several methods are in vogue in countries where oats are extensively grown to

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treat the seed against smut, predominant among these being the formaldehyde and the organic mercury compound treatments.

In India the sprinkle method of applying formaldehyde or the copper sulphate solution are some times used whenever smut infestation of seed is very bad. Both these methods are described by Butler (1918) and they have proven of value in reducing smut to a great extent. In the sprinkle method a pound of formaldehyde is diluted with forty gallons of water and the mixture is sprinkled over thirty maunds (one maund-82 lbs.) of grain. The moistened seed is kept covered under sacks for four hours after which it is dried when it is ready for the seed drills. The method is not however popular both because of the large quantities of water that are necessary and the difficulty involved in drying the seed after the treatment.

Because of these handicaps of the wet method of treatment, the writers thought it worthwhile trying the dry spray method of treating the oat seed which is in common use in the United States of America. The method was first suggested by Haskell (1917) and the ease of application of the formaldehyde and the absence of any wetting of seed, have made it popular with oat growers.

Materials and Methods

About one hundred and fifty maunds of oat seed were available for conducting the trials. The seed came from a crop which in the previous year had suffered heavily from covered smut. All of it belonged to a single type, B.S.I. About one hundred acres of land were available on the Pusa Farm and about thirty acres were available in the New Area. On the Pusa Farm area ninety-six acres were sown with treated seed and the rest with untreated seed while all the seed for the land available at the New Area was untreated. In addition to this a small plot was also available in the Mycology Section fields where a trial on a smaller scale was conducted.

The Method.--The method of applying formaldehyde as originally devised by Haskell had to be slightly modified to meet local conditions. As finally developed the method is as follows: Spread twenty-four maunds of the seed on a clean floor in an even layer which should not be more than eight inches thick. Place a pound of formaldehyde in a six-pint hand pressure-sprayer and dilute it by pouring into the sprayer an equal volume of water. Close the tap and pump the sprayer to obtain proper pressure. One labourer applies the mixture to the grain holding the sprayer close to the seed and walking in the grain in the meanwhile. Two other labourers follow this man turning the seed upside down with their legs and this operation is continued until most of the mixture has been sprayed. New gunny sacks enough to cover the oat seed when made into a pile are also sprayed with a little of the mixture.

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The seed is then made into a heap and covered with the treated sacks. The process is simple and takes not more than half an hour in all and is best done on a still evening. The place where the seed is spread should be protected from drafts. The labourers have to be provided with handkerchiefs to cover their nostrils and mouths and they should throw back their faces so as to minimise the chances of their being injured by the formaldehyde fumes. The next morning the heaps are uncovered and the seed is ready for the seed drills.

The seed is hardly wetted by this process and if it cannot be immediately sown it can be stored for some weeks without injuring its viability.

Results

Pusa Farm and New Area.--Sowing was done in the second and third weeks of October 1933. Four acres on the Pusa Farm were also sown with untreated seed. Germination in all the plots was quite good but a laboratory test was also carried out to determine the per cent. germination of treated and untreated seed. The results recorded in Table I were carried out in Petri dishes containing moistened filter paper.

Table I

Germination tests with formaldehyde treated and untreated oat seed in Petri dishes.

Test No.	Treated or untreated	No. of seed per dish	No. germinated	Mean germination
1	Treated	100	97	)
2	Treated	100	97	)
3	Treated	100	99	) 97.6 per cent.
4	Treated	100	96	)
5	Treated	100	99	)
6	Untreated . . .	100	98	(
7	Untreated . . .	100	98	(
8	Untreated . . .	100	95	(96.8 per cent.
9	Untreated . . .	100	96	(
10	Untreated . . .	100	97	(

From the data recorded in Table I it will be noted that germination in the treated lot of seed was actually higher though there was not any significance in the difference. The treatment had not therefore impaired the germination capacity of the seed in any way.

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The crop on the Pusa Farm and the New Area was harvested in March 1934. All the fields where treated seed had been used were carefully examined for any smutted heads. In an area covering ninety-six acres, there was not a single smutted plant but in the New Area where untreated seed had been sown smut appeared to be rather bad. Even in the four acres on the Pusa Farm where untreated seed had been sown, intensity of smut infection seemed to be severe.

In order to determine the extent of damage actual counts of healthy and diseased plants were made. From one field about thirty-six acres in extent which was sown with treated seed on the Pusa Farm, twenty harvested bundles were selected at random and a like number was also brought from the New Area (twenty-five acres) where untreated seed has been sown. Diseased plants were first separated from each bundle and the healthy and diseased plants then counted. The results are recorded in Table II.

Table II

Incidence of covered smut in oats treated and untreated with formaldehyde by the dry spray method.

Bundle No.	Treated		Untreated		
	Total plants	Plants smutted	Total plants	Plants smutted	Per cent. smut
1	2700	Nil.	2317	36	1.55
2	2150	Nil.	2344	104	4.43
3	2317	Nil.	4266	57	1.34
4	1532	Nil.	1613	65	4.03
5	2197	Nil.	2221	117	5.27
6	2587	Nil.	2956	93	3.15
7	3541	Nil.	2804	153	5.46
8	1434	Nil.	2392	149	6.23
9	1211	Nil.	2309	58	2.51
10	1649	Nil.	2574	189	7.34
11	1807	Nil.	2577	60	2.33
12	1854	Nil.	2632	445	16.91
13	1627	Nil.	2672	95	3.56
14	1848	Nil.	2819	51	1.81
15	1705	Nil.	2654	133	5.03
16	1867	Nil.	2024	82	3.09
17	2073	Nil.	1717	47	2.74
18	1623	Nil.	1637	85	5.19
19	2139	Nil.	2413	39	1.62
20	1609	Nil.	2235	59	2.64

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It will be noted that there was complete control of smut in the treated samples while in the untreated samples intensity of smut varied from 1.34 to 16.91 per cent. average being 4.31 per cent. In the four acres on the Pusa Farm where untreated seed had been sown there was also considerable smut but as the crop formed part of an experiment of the Imperial Agriculturist, no samples could be taken for the purpose of making the counts.

In order to determine the efficacy of the treatment another trial was conducted at the same time in the Mycology Section plots. The seed came from the same source as before and was treated as follows:--

A. Naturally infected seed.
B. Naturally infected seed but treated with formaldehyde by the dry spray method.
C. Same seed as in A but artificially infested with smut spores and then treated with formaldehyde.
D. Same seed as in C but without treatment.

The available land was divided into twenty plots of four lines each, distance between lines being nine inches and each line being sixty-two feet long. The plan of sowing the seed treated in four different ways was arrived at by randomising the plots, the plots being grouped into five blocks of four plots each. Sowing was done on the 16th of October 1933, seed being six inches apart and there being two seeds per hill. Germination was good and there was not any other disease in the crop.

On the 22nd of March 1934 the crop was harvested by uprooting the plants. The total number of plants in each plot and the number smutted were counted, after which the bundles were threshed and the yield of each plot was noted down. The data of germination, plants smutted and yields are given in Table III.

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Table III.

Germination, extent of smut and yield of formaldehyde treated oat seed, in five blocks of four plots each.

Blocks	Treatments											
	A			B			C			D		
	Germination	Smutted	Yield in lbs.	Germination	Smutted	Yield in lbs.	Germination	Smutted	Yield in lbs.	Germination	Smutted	Yield in lbs.
I . .	703	28	14.7	732	0	16.0	700	0	14.5	717	20	13.5
II . .	732	36	12.6	710	0	15.6	660	0	16.5	734	37	13.7
III . .	722	33	10.2	747	0	10.6	725	0	14.8	758	33	11.6
IV . .	675	39	10.8	736	0	13.0	696	0	15.0	701	28	9.5
V . .	674	34	12.5	721	0	16.5	773	0	14.8	757	46	13.3

In each plot nine hundred and ninety-two seeds had been sown and there should have been that many plants in each plot. As the actual number of plants per plot varied an analysis of variance test was applied to see whether there was any significance in the difference in germination in the variously treated plots. Data are recorded in Table IV.

Table IV.

Analysis of variance to determine if the treated plots are significantly worse than the untreated plots in their germination.

Due to	Degrees of freedom	Mean square	
Blocks	4	930.45	
Treatments	3	1165.30	$v_1 = 1165.3$
Errors	12	770.00	$v_2 = 770.0$
Total .	19		

$$x = \frac{1165.3}{770.0} = 1.5133.$$

Referring to Mahalanobis' table [1933] it is found that for $n_1 = 3$ and $n_2 = 12$, the value of x must be 3.49 for five per cent. level of significance or 5.953 for one per cent. level of significance in order that the differences may be considered statistically significant. As the value obtained is very low, there is not any significance so that germination in treated and untreated plots is alike.

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As for the incidence of smut, none of the treated plots had any smut.
As for yields, an analysis of variance is given in Table V.

Table V.

Analysis of variance to determine whether treated plots yield significantly higher than untreated ones.

Due to	Degrees of freedom	Mean square
Blocks	4	7.751
Treatments	3	10.8618 = v_1
Errors	12	1.7897 = v_2
Total .	19	

$$x = \frac{10.8618}{1.7897} = 6.069$$

Again referring to Mahalanobis' [1933] table, it is found that for $n_1 = 3$ and $n_2 = 12$, the value of x must be 3.490 at five per cent. level of significance and 5.953 at one per cent. level of significance. The value obtained is more than both these values showing that the higher yields given by treated plots are statistically significant.

Discussion.

The results given in the foregoing pages have shown that the application of formaldehyde in the form of a concentrated dry spray does not injure the viability of the seed, that smut is completely controlled, and that treated seed yields higher than untreated seed. About twenty per cent. more grain was obtained by subjecting the seed to this treatment. A pound of formaldehyde is enough to treat twenty-four maunds of seed which can be sown on about 25 acres of land. The cost of a pound of commercial formaldehyde is about a rupee at the present time so that the cost per acre works at about eight pies. The cost of labour is negligible. A hand pressure sprayer of six-pint capacity costs about thirty-five rupees which is the only costly item. But one should last several years.

Summary.

Concentrated formaldehyde was sprayed on smutty oat seed with a view to control the smut disease due to Ustilago kolleri Wille at the rate of a pound of formaldehyde to twenty-four maunds of oat grain.

In ninety-six acres of oat fields that were sown with treated seed, not a single smutted plant was obtained while smut was very bad in fields sown with untreated seed.

It was noted that treating the seed with concentrated formaldehyde was not injurious to the seed and that treated seed yielded about twenty per cent. higher quantity of grain than untreated seed and that this difference in yields was statistically significant.

Acknowledgments

The writers' thanks are due to Dr. M. Mitra of this section for help rendered in various ways. Thanks are also due to Mr. W. Sayer for permitting his seed to be treated by this method and for providing the land.

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STEPS IN THE FORMATION OF AN EGG IN A HEN SHOWN IN A KANSAS STATE COLLEGE COLOR MOTION PICTURE

EDITOR'S NOTE:- The making of the motion picture described here is one of the few instances in which a color film has been used for recording operative technique. This picture was shown at the meeting of the National Poultry Science Association, Blacksburg, Virginia, early in August.

Significant possibilities for scientific research in poultry husbandry and other fields, as well, have been opened up by the successful use of color motion picture photography to show the successive steps in egg formation in the hen. This was made possible by operative technique worked out by H. M. Scott and D. C. Warren of the Department of Poultry Husbandry, Kansas State College of Agriculture and Applied Science, Manhattan, Kansas. The film was made in connection with studies on the mechanics of ovulation, which were being carried on by R. E. Phillips and Dr. Warren.

"Special emphasis was given to the actual act of ovulation, which has been a problem of investigation in the vertebrates for many years," Dr. Warren states. "The bird was especially satisfactory for study of this sort due to the large amount of yolk material being carried along with the ovum. In addition to recording a number of ovulations, this film also shows the manner of engulfment of the ovum by the infundibulum, as well as the passage of the ovum through the oviduct. The addition of white, membranes and shell are all recorded."

"BROWN PATCH" ON LAWNS CAN BE PREVENTED BY THE TIMELY USE OF MERCURY COMPOUNDS

EDITOR'S NOTE:- There is reprinted here a warning against "brown patch" and a discussion of means of preventing diseases which are responsible for serious damage to lawns. This was written by Dr. Howard B. Sprague, Agronomist, New Jersey Agricultural Experiment Station, New Brunswick, New Jersey, and issued in the form of a multigraphed sheet.

Many types of brown patch injury occur on lawns. Some are induced by drought, others by lack of sufficient plant food, excessive soil acidity, and burning with soluble fertilizers. However, there are two distinct types of brown patch, known respectively as "large", and "small" or "dollar" patch, caused by a fungus or mold which invades the grass leaves. The true brown patch diseases frequently attack bent grass lawns during warm humid weather.

Control of these diseases is accomplished by the timely application of mercury compounds. Treatment for brown patch injury requires considerable care in order to be effective and to avoid impairment of the turf. Complete details for the treatment of brown patch will be provided upon request by the New Jersey Agricultural Experiment Station. Fortunately, prevention of brown patch is relatively simple and inexpensive. Perhaps the most important factor in preventing the disease is the choice of resistant types of grass. The bent grasses are the only group of grasses seriously affected by brown patch. A lawn mixture composed largely of Kentucky blue grass and Chewings fescue, therefore, will not suffer from attacks by either type of brown patch.

Lawns containing considerable amounts of susceptible types of Colonial, Creeping, or Velvet bent grass will be less subject to injury providing the grass is maintained at a height of at least one inch, than if the turf is mowed closely. Correction of soil acidity by use of lime, and the withholding of fertilizers during the summer months, are desirable practices. In general, fertilizers should be applied only in autumn or early spring. A rank succulent growth stimulated by frequent artificial watering should also be avoided. Turf which grows slowly is less susceptible to disease than rapidly growing grass.

BLASTING GULLY BANKS CONTRIBUTES TO BETTER GROWTH OF TREES AND OTHER VEGETATION ON BANKS AND BOTTOM

EDITOR'S NOTE:- It must be recognized that making possible the grading of steep gully banks by blasting was a real achievement, but of hardly less importance is the fact that blasted soil is especially suited to the growth of tree seedlings and other vegetation.

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Nothing is more essential to success in gully control than the growth of trees and other vegetation on the banks and in the bottom of a gully. But obtaining growth in profusion, especially on banks, has been one of the most difficult things erosion control experts have experienced in conservation work.

Engineering skill long ago solved such problems as the making of cut-off ditches to divert the flow of water into gullies, and developed methods of constructing the proper types of soil-saving dams to meet any and all conditions. Bank-grading practices applicable to sloping banks also have been greatly improved.

Under favorable conditions, grading can be done with a team or a tractor and the necessary other equipment. But the grading of gullies with almost vertical banks, except by manual labor and at a high cost, was long found impracticable. Such work can not be done by mechanical means because of the drop-off edges of the gully banks. The result has been that until within the past few years little attempt was made to prevent continuation of erosion of thousands of such gullies.

Blasting Proves Successful in Grading

Agricultural engineers have developed efficient and economical methods of blasting the top sides of sheer gully banks to throw the fertile topsoil into the gully. The explosions shatter the soil so completely that it may be graded with a minimum amount of labor and permit the planting of trees, bushes and the like.

The use of explosives has proven so successful that blasting gully banks is now an established practice in many sections of the country. Civilian Conservation Corp units, working on erosion control in more than a score of States, are using explosives in their regular bank grading programs.

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Trees Grow Better on Blasted Soil

During the past several years it has been demonstrated time and again that vegetation grows better on gully banks that have been blasted. This is due to the thorough breaking up of the topsoil deposited and its depth. Observers report that whereas the usual "catch" of tree seedlings is 35 per cent it runs up to 80 to 90 per cent on blasted areas. This is the showing for trees of different kinds, though the black locust has been found to be the most satisfactory species for planting gully banks and gullies where it is indigenous.

Approved Blasting Methods Decribed in Booklet

For the use of agricultural engineers and others engaged in erosion control work there has been prepared a handy booklet which describes and illustrates approved methods of gully bank blasting and other operations necessary to a well-rounded erosion control program. Copies will be sent on request. These booklets are for domestic distribution only.

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